Investigating the Equine Arteritis Virus Seroprevalence in Prince Edward Island

Samantha Shute*, Michaela Green*, Martha Mellish*, Jason Stull *, W. Ben Stoughton*

Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island, 550 University Avenue, Charlottetown, PE, C1A 4P3

Abstract

- **The Equine Arteritis Virus (EAV) is a single-stranded RNA virus that can cause respiratory distress, abortion, limb edema, interstitial pneumonia and neonatal fatalities[1]**
- **Although many viruses circulate in the PEI Standardbred population, the presence of EAV has never been confirmed until the spring of 2023 at the Atlantic Veterinary College**
- **Acquired and passive immunity can increase seropositivity, live foal rates and decrease the severity of clinical signs[3]**
- **Endemic in many Standardbreds populations, this virus generally doesn't pose great health or economic risks[2]**
- **A naïve population is hypothesized to experience increased EAV signs due to an unprotected immune system[3]**

Goal: Determine the seroprevalence of EAV, yearly live foaling rates, and if the PEI Standardbred population was naïve prior to the outbreak that surfaced in 2023.

CONFIRMED
A positive result on RT-PCR, a mare that had a deceased neonate that was positive on RT-PCR, or an equine with a paired titer change of 4-fold or more

SUSPECTED
An equine with a high EAV-SN titer and have been in contact with a confirmed positive case

PROBABLE
An equine that had contact with a confirmed positive case and is showing clinical signs

Materials and Methods

Blood Testing
- **Blood serum is collected and tested for Equine Arteritis Virus neutralizing antibodies via serum neutralization testing (EAV-SN)**

Farm Surveys
- **Details collected regarding pregnancies, abortions, foal deaths, and live foals, travel, and breeding from 2021 to 2024**

Historical Seroprevalence
- **Blood samples from studies performed in 1999 to 2001, 2004, and 2018 were tested (EAV-SN)**
- **EAV testing records from the Atlantic Veterinary College for Standardbred horses from 1990 to 2024 examined**

TrackIT Live Foal Rates
- **Live foaling rate statistics from 2021 to 2023 collected from the Standardbred Canada TrackIT program in PEI**

Results

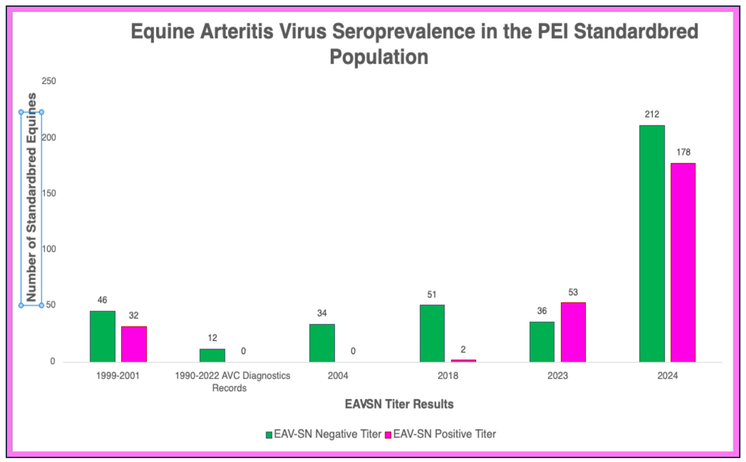

Figure 1: Historical estimated seroprevalence in sample groups collected ranging from 1990 to 2024 with the highest count of seropositive results in 2024 with an estimated population seropositivity of 45.6%.

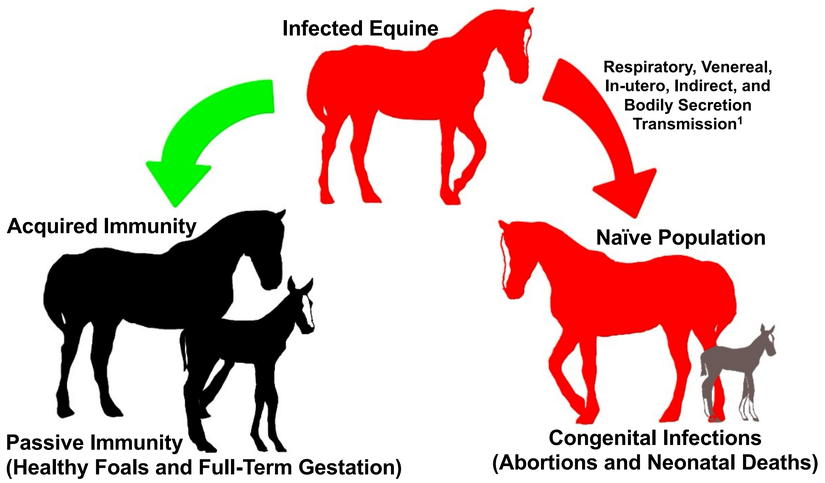

Figure 2: Transmission of EAV in a protected population (left) vs. a population with no previous exposure to the virus or vaccinations, resulting in catastrophic health effects

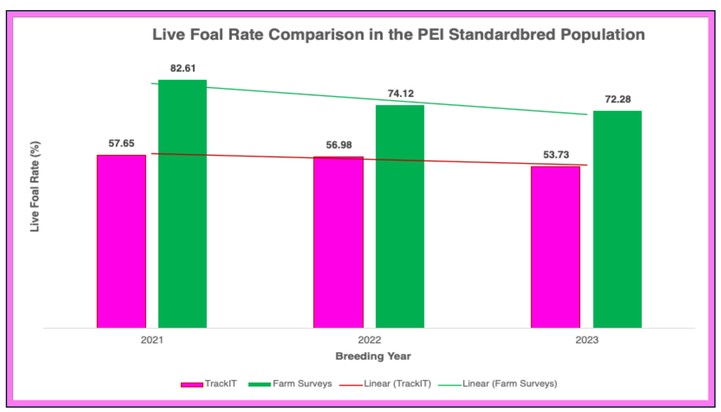

Figure 3: Live foaling rates from 2021 to 2023 collected from the entire population through TrackIT vs. collected from farm surveys of a sample set of the PEI Standardbred population, both showing consistent decline

Conclusions

- **A decreasing live foaling rate could indicate congenitally acquired EAV infections resulting abortions and deaths[1]**
- **Seropositive samples from a study conducted in 1999 to 2001 could indicate an outbreak, however deduced from the minimal seroprevalence of years following, they may have stopped breeding, are deceased, or were part of a closed herd with minimal transmission**
- **Two seropositive samples from a study conducted in 2018 may have been from an exposure and recovery outside of PEI without transmitting to other equines**
- **A paired EAV-SN titer was conducted on one of the 2018 seropositive equines in 2024, showing a two-fold increase, indicating a repeated exposure since 2018**
- **From the surfacing of the outbreak, the decreasing live foaling rates, increasing neonatal deaths, abortions, and confirmed EAV cases with a 2024 Standardbred population estimated seroprevalence that increased to 45.6% from a low estimated seroprevalence supports the hypothesis that the population of PEI Standardbred equines were naïve to EAV prior to the initial exposure dated near to the first neonatal confirmed EAV deaths**

Future Research and Outbreak Prevention

- **Determine the correlation between the growth of the PEI Standardbred population and the seroprevalence**
- **Conduct virus genome sequencing on EAV samples found in PEI to compare with EAV found outside of PEI**
- **EAV vaccines have arrived in PEI through an emergency drug release in the spring of 2024 and vaccination have begun with the aim to vaccinate the seronegative population to decrease health risks and economic losses**

References

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2: Holyoak, G. R., Balasuriya, U. B. R., Broaddus, C. C., & Timoney, P. J. (2008). Equine viral arteritis: Current status and prevention. *Theriogenology*, *70*(3), 403–414. https://doi.org/10.1016/j.theriogenology.2008.04.020

3: Timoney, P. J., & McCollum, W. H. (1993). Equine Viral Arteritis. *The Veterinary Clinics of North America. Equine Practice*, *9*(2), 295–309. https://doi.org/10.1016/S0749-0739(17)30397-8

Acknowledgements

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